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INLAND LAKES PROGRAM
BLUE-GREEN ALGAE AND THEIR CAUSES

What are blue-green algae?

Blue-green algae, like other algae, are primitive types of plants that thrive in freshwater lakes. Fossils demonstrate that blue-green algae were among the first organisms to inhabit the earth. Today, there are more than 1,300 species of blue-green algae inhabiting lakes, ponds, streams and soils.

Some species consist of only one cell, while others are colonies of many cells in which each cell functions independently. Like other plants, blue-green algae contain chlorophyll and other pigments, which impart a green or bluish-green color to their cells.

Where are they found?

In North America, blue-green algae are most commonly found in lakes and ponds which have been enriched with plant nutrients from municipal, industrial and agricultural sources.

They are also widely distributed throughout the rest of the world, and can be found in tidal pools, coral reefs and tidal spray zones, as well as in soil down to a depth of one metre or more, and on the moist surfaces of rocks and trees.

Blue-green algae are capable of living in some of the earth's most inhospitable areas--in cold lakes beneath ice, in hot springs and even on the undersides of desert rocks.

What conditions promote growth?

Effluent from municipal wastewater treatment plants is a frequent source of phosphorus and other nutrients required for growth of blue-green algae. As well, localized areas of the Great Lakes and several smaller inland lakes and reservoirs experience blooms of blue-green algae due to natural nutrient sources or other inputs of phosphorus which are difficult to control.

What causes them to accumulate?

In their single-cell form and at low cell concentrations, blue-green algae float largely unnoticed in Ontario's freshwater habitats. However, "blooms" of blue-green algae develop when high densities of cells suspended in the water clump together and float to the surface.

Unlike other algae, blue-green algal cells have gas vacuoles--cavities that act much like tiny balloons--which can inflate and deflate according to several complex conditions of growth, including intensity of light and the availability of nutrients. By controlling the gas vacuoles, blue-green algae are able to regulate their buoyancy. Surface blooms occur when this buoyancy regulation ceases to function because of some imbalance or sudden change in the aquatic environment--usually related to an abrupt change in the water or to the lack of nutrients.

Surface blooms of blue-green algae are most annoying when they blow onto beaches and foul swimming areas in thick pea-soup-like accumulations.

How do the algae effect us?

Some species of blue-green algae are of direct benefit and use to humans. For example, one type found in parts of Europe and Africa, is harvested for its nutritional value as protein and vitamin supplements. But others can be harmful to our health. In addition to the esthetic problems they create, many species are potential toxin producers. These toxins affect the nervous and respiratory systems of warm-blooded animals when ingested from lake or pond water harboring high densities of this algae.

In Ontario, several cattle deaths have been linked with blue-green algae poisoning. More common problems with humans include allergic skin reactions and flu-like symptoms. These reactions can occur if blue-green algae are accidentally ingested while swimming. In addition, they can give water an unpleasant odor, taste and color, and result in the closure of swimming areas.

Blue-green algae are undesirable for other reasons. They are generally not consumed as food by other aquatic organisms the way other, more desirable, algae are. As well, death and decomposition of blue-green algal blooms often contributes to sudden loss of oxygen in lake water, resulting in the death of fish.

What can be done?

The first line of attack on blue-green algae is to correct the cause of the problem, rather than the symptoms. Most effective is reduction of algae-promoting phosphorus. The phosphorus content of sewage treatment plant waste has been reduced substantially since legislation to limit the use of high-phosphate detergents was introduced in 1970. Additions of lime and other chemicals to wastewater are also effective in removing phosphorus from effluent prior to discharge to receiving waters.

In this area, efforts are continuing throughout the province to identify and control excessive inputs of nutrients to lakes and reservoirs. It is recognized, however, that blue-green algae problems exist in many lakes and reservoirs of southern Ontario for which there is no practical solution other than to treat the symptoms.

Under Ontario's inland lakes program, research is being conducted to determine ways of eliminating blue-green algae from certain small lakes and reservoirs which are important for recreational use or as water supply sources for livestock. All the proposed methods are designed to control blue-green algae by altering nutrient ratios and other factors so that other, more desirable, algae are favored. Ministry research seeks to identify practical, effective controls of troublesome blue-green algae.

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